

1 We claim:

1 1. A method, comprising:

- 2 a) providing an apparatus, comprising an optical fiber having an axis, the optical fiber  
3 comprising a solid outer cladding region and a core region, the cladding region  
4 surrounding the core region, wherein the core region contains a plurality of holes  
5 elongated in the direction of the axis; then
- 6 b) introducing an optically active material into at least one hole, wherein the optically active  
7 material is adsorbed on an interior surface of the hole; then
- 8 c) propagating a laser beam into the optical fiber; then
- 9 d) detecting the interaction of the laser beam with the material adsorbed on the interior surface of  
10 the hole.

1 2. The apparatus of claim 1, wherein the optically active material is a Raman active material.

1 3. The apparatus of claim 1, wherein the optically active material is an infrared active material.

1 4. The apparatus of claim 1, wherein the optically active material is a biothreat material

1 5. The apparatus of claim 4, wherein the optically active material is a bacterium.

1 6. The apparatus of claim 4, wherein the optically active material is a nerve gas molecule.

1 7. The apparatus of claim 1, wherein the optically active material is a pollutant material.

1 8. The apparatus of claim 7, wherein the optically active material is carbon monoxide.

1 9. The apparatus of claim 7, wherein the optically active material is a nitrogen oxide.

1 10. An apparatus, comprising;

2 an optical fiber having an axis, the optical fiber comprising a solid outer cladding region and a  
3 core region, the cladding region surrounding the core region, wherein the core region  
4 contains a plurality of holes elongated in the direction of the axis, and wherein at least  
5 one hole contains optically active material adsorbed on the interior surface of the hole.

1 12. The apparatus of claim 10, wherein the optically active material is a Raman active material.

1 13. The apparatus of claim 10, wherein the optically active material is a infrared active material.

1 14. The apparatus of claim 10, wherein the optically active material is a biothreat material.

1 15. The apparatus of claim 14, wherein the optically active material is a bacterium.

1 16. The apparatus of claim 14, wherein the optically active material is a nerve gas molecule.

1 17. The apparatus of claim 10, wherein the optically active material is a pollutant material.

1 18. The apparatus of claim 17, wherein the optically active material is carbon monoxide.

1 19. The apparatus of claim 17, wherein the optically active material is a nitrogen oxide.

1 20. A system, comprising;

2 an optical fiber having an axis, the optical fiber comprising a solid outer cladding region and a  
3 core region, the cladding region surrounding the core region, wherein the core region

- 4 contains a plurality of holes elongated in the direction of the axis, and wherein at least  
5 one hole contains optically active material adsorbed on the interior surface of the hole;
- 6 a laser apparatus for introducing laser pump light into the fiber;
- 7 optical apparatus for removing light from the fiber; and
- 8 control means for controlling the laser apparatus.